

17 hours in January, fell a little in February, and rose to  $4\frac{1}{2}$  days, the annual maximum in March, from which it rapidly declined to the minimum in June. On a mean of the past forty-one years the monthly averages are in excess from May to August inclusive, August and May being decidedly the months of maximum rainfall, whilst January and February are the months of least rainfall. From 1836 the annual amounts show with some interruptions a decided increase in the rainfall up to 1868, since which year there has been as decided a decrease. This result is generally corroborated by the rainfall at Washington, Philadelphia, and Providence, which Mr. Draper adds to his Report. A valuable table of the monthly amounts from 1836 to 1876 is printed at p. 6. In accordance with the suggestion thrown out by Mr. Hill (*NATURE*, vol. xvi. p. 505) the amounts for the winter months have been picked out, averaged for the eleven-years sun-spot period, and bloxamed. The results, thus worked out, are in inches these, beginning with the first year of the cycle:—22'57, 22'26, 22'92, 23'31, 22'24, 21'03, 21'98, 21'05, 21'14, 22'18, and 23'56.

**METEOROLOGY IN RUSSIA.**—The St. Petersburg Agromonomical Society has appointed a special committee for the purpose of elaborating, in accord with other Russian scientific bodies, a scheme for establishing throughout Russia an extensive network of meteorological stations. Owing to the interest manifested in the subject by a great number of agriculturists, it is expected that the plan will soon be put into execution.

### NOTES

WE much regret to have to announce the death, on Sunday last, of Mr. Robert Swinhoe, F.R.S., a naturalist whose numerous contributions to our knowledge of the mammalia and birds of the Chinese Empire have proved invaluable to zoological science. We hope, next week, to give an account of Mr. Swinhoe's work.

THE International Committee for the erection of a monument to Liebig at Munich, having now at their disposal a sum of 120,000 marks, invite sculptors of all nations to send in models for their acceptance. A prize of 2,000 marks will be given to the model which takes the first place, and 1,500 to the second. The model of the statue should be forty centimetres, and of statue and pedestal about one metre in height. Models should be addressed to the "Castellan der königlichen Akademie der Künste, 38, Unter den Linden, Berlin," where they will be received from June 1 to 15, 1878, to be exhibited first at Berlin and then at Munich. The Committee bear all the expenses of transport.

It has been noted in the French papers *à propos* of the recent colliery explosion, that M. Leverrier, when presiding at the meeting of the French learned societies at Easter, proposed to extend the telegraphic warnings of the International Meteorological System to the several French pits. The question of the illumination of mines by electricity has been revived by these terrible tragedies, and a number of interesting communications connected with that important topic will be presented and fully discussed at the next meeting of the French Academy of Sciences.

It was stated by one of the speakers at the last quarterly meeting of the French Academies that M. Thiers had written a complete work on Spherical Trigonometry when quite a young man.

WE regret to record the death of M. Cazin, Professor of Physics at one of the Paris Lycées, and an active member of the Paris Physical Society. M. Cazin was sent to the Island of St. Paul by the Academy of Sciences under the command of Capt. Mouchez to make physical observations during the last transit of

Venus; he there contracted the germ of the illness which has proved fatal at the early age of forty years. He had been admitted to the Observatory by M. Leverrier to execute a series of delicate researches on magnetism, which have been left unfinished.

THE Harveian Oration at the Royal College of Physicians of London will be delivered in 1878 by Dr. J. Burdon Sanderson, F.R.S.

AN anthropological exhibition will be opened at Moscow in 1879, in connection with the society of Friends of Natural Science. Many objects of great scientific value, almost exclusively of Russian origin, are already in the hands of the organising committee.

MR. TUCKWELL, recently head-master of Taunton College School, has issued a circular addressed to head-masters, giving an account of his connection with the school whose reputation he did so much to raise, and which has treated him so ungratefully. Our readers are already familiar with the details of this unhappy matter, and we are sure will all wish with us that Mr. Tuckwell may soon find a field for the exercise of his powers as a successful teacher unfettered by the narrowness of uneducated and narrow-minded directors. Mr. Tuckwell gave Taunton School a status and a name; the Council of the school have undone all his work, and left the school nowhere.

THE winter session of the Chester Society of Natural Science opened on October 25 with a lecture on "The Arctic Regions," by Mr. de Rance, of H.M. Geological Survey. The upper silurian, lower carboniferous sandstones, mountain limestone, and lias of the Parry Archipelago, as well as the oolites, cretaceous and miocene rocks of Greenland and Grinnel Land, were described as occupying hollows in the old Laurentian Mountains, and the existing cold climate was stated to have probably only prevailed since the last glacial epoch. The range of the northern mammals, and the discovery of remains of the Eskimo by Capt. Feilden, R.N., naturalist of the *Alert*, near Cape Beechey, far north of the present limit of human habitation, and further north than any previous discovery of man or his works, were commented on; and a large collection of Arctic fossils were exhibited by Sir Phillip Egerton, collected in Grinnel Land by his nephew, Lieut. Egerton, R.N., of the late British Arctic Expedition.

AN unusually interesting scientific *soirée* was recently held at the Bristol Museum and Library, which has been characterised as "the headquarters of scientific research in the west of England." Many of the most recent scientific experiments were shown, the most attractive probably being Prof. Graham Bell's exhibition of the wonders of the telephone. During the winter a course of lectures has been arranged for at the museum, mostly scientific, as follows:—November 19—A. R. Wallace, F.R.G.S., F.L.S., the Distribution of Animals as indicating Geographical Changes; November 29—Prof. Ball, F.R.S., a Night at Lord Rosse's Telescope, illustrated by the Oxy-hydrogen Lantern. December 10—Frederick Wedmore, Rembrandt; his Life and Work. January 14—Prof. Marshall, M.A., Principal of University College, Bristol, The Economic Condition of America. January 28—Prof. W. C. Williamson, F.R.S., Coal and Coal Plants. February 11—C. T. Hudson, M.A., LL.D., The Larger and Rarer Rotifers; illustrated with Transparent Diagrams. February 26—Prof. Rowley, M.A., of University College, Bristol, Francis Bacon: his Personal Character and Political Career. March 11—Dr. J. H. Gladstone, F.R.S., Fiery Meteors and Meteoric Stones. March 25—J. Norman Lockyer, F.R.S., Sun Spots in Relation to Indian Famines, with Spectroscopic Experiments and Oxy-hydrogen Lantern Illustrations.

THE Royal Society of New South Wales, originated in 1821 as the Philosophical Society of Australia; after an interval of repose it was revived in 1850 as the Australian Philosophical Society, by which designation it was known until 1856, when the name was again changed to that of the Philosophical Society of New South Wales, and finally, about ten years ago, by the sanction of her Majesty the Queen, it assumed its present title. Judging by its present list of members it would seem to be prospering, but judging from the volume of its *Proceedings* (vol. x. for 1876) its scientific life might be higher, and we would venture to express the hope that future volumes may give us a larger number of memoirs treating of that vast quadrilateral of which Sydney is the acknowledged capital. Of the articles in this volume we would notice the following: On the Deep Oceanic Depression off Moreton Bay, by the Rev. W. B. Clarke, F.R.S.; On some Tertiary Australian Polyzoa, by the Rev. J. E. T. Woods. The species were with one exception derived from the Mount Gambier polyzoon limestone, South Australia, and are all described as new; ten are described and figured as belonging to the genus *Eschara*, two species of the genus *Pustulipora* are described, and one *Tubulipora*. On the formation of Moss Gold and Silver, and on a Fossiliferous Siliceous Deposit from Richmond River, is the title of a paper by Prof. Liversidge. The composition of this deposit shows that it answers to the common siliceous sinters or geyser deposits. The weathered surfaces are usually marked with the remains of ferns which stand out in relief, and more rarely through the mass are to be found the remains of certain fruits and seeds. These latter have been described by Baron Müller as belonging to a plant (*Liversidgea oxyspora*) allied to *Capparidæ* and *Bixacæ*, the fruits are from two-thirds to nearly an inch in diameter, divided into four turgid lobes, placentas parietal; seeds turgid; oval towards one extremity and attenuated at the other; both fern and fruits are figured. In the discussion following the reading of a paper by the Rev. W. B. Clarke, F.R.S., On the Effects of Forest Vegetation on Climate, many interesting statements were made as to the condition of the forests in the neighbourhood of Sydney at the present time, and so long back as forty years ago.

PETERMANN'S *Mittheilungen* for November contains a paper by Dr. G. Radde describing the journey of himself and Dr. Sievers from Erzeroum to the Bin-Gol-Dagh; the paper is full of details concerning the botany of the region traversed. Under the title of "Tekna and Nun," Dr. Rohlf's gives some valuable information on the part of the Sahara about the south-west of Morocco, showing that it is by no means so barren as is generally thought, and that even the most recent maps of the region are unsatisfactory.

ONE of the most interesting papers in the September number of the *Bulletin* of the French Geographical Society is an account by M. Brau de St.-Pol-Liais of his visit to the French Colonial stations recently established on the coast of Sumatra, in the province of Deli. The author gives many interesting observations on the people and the products of the part of the island which he visited, and speaks hopefully of the colony, which he considers an excellent basis for the exploration of the island. In the same number Dr. Harmand gives some account of recent journeys he made in Cambodia.

THE first map showing the whole of Stanley's route from Bogomayo to the mouth of the Congo has been published by *L'Exploration* (October 21). In this map the course of the Congo is roughly shown as indicated in Stanley's letter, and that also of the Ogové according to the explorations of de Brazza, Lenz, and Marche. The trend of the Ogové to the south-east is shown, and its probable junction with the Congo by two arms indicated.

THE Geographical Society of Paris has received letters from

the French Consul at Zanzibar informing them that a road is being opened from Zanzibar to Tanganyika, for carting by oxen. It is expected that ere long explorers will be able to dispense with native porters.

A GEOGRAPHICAL paper has been started at Lyons by M. du Mazet, one of the staff of the *Courrier de Lyon*. It will record the transactions of all the provincial geographical societies of France. The Lyons Geographical Society will have the advantage of a number of communications from the Roman Catholic missionaries who have an old-established special seminary and college in that city.

IN the *Times* of Wednesday last week appeared a long story about the discovery of the remains of Columbus in St. Domingo. At Madrid, the *Times* Paris correspondent now states, the story is declared to be a hoax, inasmuch as "a Spanish squadron years ago escorted the remains to Havannah, where they lie in the Cathedral."

UNDER the title of "Pictorial Geography for Young People," Messrs. Griffith and Farran have published a neat little map intended to exhibit graphically the significance of the various terms used in geography—continent, island, river, lake, mountain, volcano, city, &c. It is necessarily exaggerated, but in the hands of a judicious teacher might be a valuable and attractive help to the teaching of the elements of geography.

TWO severe shocks of earthquake were experienced at Lisbon at 6.45 A.M. of October 25. No damage was reported.

UNDER date October 17, it is reported from Smyrna, in Asia Minor, that there had been, during a few days, several earthquake shocks doing no further harm but cracking some walls.

IT has been affirmed by P. Secchi of Rome, that iron heated red is transparent to light. This is denied by M. Govi of Turin, who, in a paper to the French Academy, describes some experiments on the subject, and shows how one may be deceived in studying the phenomena. If a mixture of borax and carbonate of soda be fused in a thin platinum crucible raised to a red heat, there will be seen on the exterior of the vessel the form of the liquid mass with all its accidents of rapidly varying form, indicated by a zone of less brightness than the upper portion of the metallic surface. At first sight it is natural to infer a transparency for light of the heated platinum, but (M. Govi points out) the case is really one of transparency for radiant heat; that is to say, a phenomenon connected with the good conductivity of platinum. The liquid, liberating carbonic acid, is less hot than the crucible, and is constantly borrowing heat from it. It is inevitable, then, that at every point where the liquid touches the metal, the latter relatively cooled, should appear less luminous than in the neighbouring region. M. Govi gives some other examples of the phenomenon.

"SHORTHAND FOR GENERAL USE" is the title of a little volume by Prof. Everett, of Belfast, published by Marcus Ward and Co. Prof. Everett's system claims several advantages over Pitman's, one being that the vowels can be written continuously with the consonants, and thus the word has not to be gone over a second time to insert the vowels. The system appears to us decidedly worth the attention of anyone wishing to learn shorthand.

WE have received the eighth edition of Prof. Atkinson's translation of Ganot's "Physics." About sixty pages of additional matter, with an equal number of illustrations, have been added to this edition. Messrs. Longmans and Co. are the publishers.

ANOTHER scientific play is now being performed at the Cluny Theatre, Paris, under the title of the "Les 6 Parties du Monde." It is written by M. Figuier, the well-known scientific story-teller. The sixth part of the world is supposed to be the Antarctic



continent, where Dumont Durville is made to land. It is a masterly panorama of a number of climes and countries, enlivened by a well-constructed plot.

DR. HOEK, of Leyden, sends us the following additions to the list of dealers in zoological specimens given by Prof. Ray Lankester in a recent number of *NATURE*:—1. Hilmar Lührs, Fischer f. Zoologen und Aquarien, Helgoland (Unterland), for fish and invertebrates (alive and in spirits, specimens of all classes). 2. The Zoological Station of Dr. Anton Dohrn, Naples, for fish and invertebrates (spirit specimens).

THE additions to the Zoological Society's Gardens during the past week include three Tigers (*Felis tigris*), born in the Gardens, but did not survive; a Common Genet (*Genetta vulgaris*) from North Africa, presented by Mr. P. V. Carletti; two Hyacinthine Porphyrios (*Porphyrio hyacinthinus*) from West Asia, presented by Mrs. Henry Cobb; two All-Green Parakeets (*Brotogeris tiriacula*) from South America, presented by Miss Rowe; two Yellow-bellied Liothrix (*Liothrix luteus*) from India, presented by Gen. Breton; two common Marmosets (*Hapale jacchus*) from South-east Brazil, presented by Mrs. Clayton; three Darwin's Pucaras (*Pucrasia darwini*), a Chinese Blue Magpie (*Urocissa sinensis*) from China, a Sun Bittern (*Zurypyga helias*) from South America, deposited; a Moose (*Alces machilis*) from North America, purchased.

#### AMERICAN SCIENCE

PROF. HENRY'S portion of the report of the Smithsonian Institution for the year 1876 has been printed in separate pamphlet form, in advance of the entire volume, and gives the usual record of operations for the period. It draws attention to the fact that it is the thirtieth of the annual series made by him, and that the policy advised at the first meeting of the board has been carried out with scarcely any modification. The original fund of 541,379 dols. has been increased to 714,000 dols., although a building costing nearly 500,000 dols. has been erected. There is a library of 70,000 volumes of the most valuable class of books, namely, the serial scientific publications of learned societies. The museum has grown until it now ranks among the best in existence. This embraces copious collections illustrating the ethnology and natural history of the world. The institution has published twenty-one quarto and forty-two octavo volumes of transactions and reports. It has carried on successfully a great system of meteorological observations (only intermitted on the successful operations of the Signal Service), the results of which have been issued by a number of stately volumes. It is now prosecuting a great system of international exchanges, for the benefit of the whole world. Its correspondence, both at home and abroad, requires a large number of clerks and specialists; and the name of Smithsonian is universally known in consequence.

Details have been recently published (*Proc. Acad. Nat. Sci. Philadelphia*, 1877, p. 255) of the exploration of a specially interesting mound at Coup's Creek, Macoupin County, Illinois. Four skeletons sat within it, considerably enveloped in a peculiar granulated but exceedingly tenacious earth. They were placed two and two, their arms crossed, the knees of one pair pressing sharply against the backs of the other, and the faces of all turned directly toward the east. Though the greatest care was taken, only one skull was removed comparatively perfect. The whole grave measured but six feet in length by three in width, and it contained in addition to the skeletons four large marine shells of *Pyrula (Busyon) perversa* (Linn.), each similarly placed in relation to the bodies. The smaller end of one shell was placed in the right hand of each individual, while the larger portion rested in the hollow above the left hip. But, still more remarkable, within each shell had been packed what appeared to be the bones of a child; the skull, crushed before burial, protruded beyond the aperture. The suggestion is made that these infants were sacrificial offerings in honour of the dead. The graves in these mounds are constructed of stone slabs from the locality, and hence they are known as stone graves. The builders give evidence of decided constructive ability, and of having been careful cultivators of the soil. The grave-mounds are found upon ridges,

while others on which dwellings were supported are near streams. A systematic series of mounds of similar origin extends from the foot of Lake Michigan to the mouth of the Illinois river, a distance of two hundred and fifty miles. Unfortunately the remains are scarcely ever capable of being preserved, or even of being examined satisfactorily on exhumation.

The following are notes of papers in the October number of the *American Journal of Science and Arts*:—The nickel plates now largely used as anodes for nickel plating are prepared by fusing commercial nickel, generally with addition of charcoal, and casting in suitable form. From an analysis of several specimens of cast nickel by Mr. Gard, it appears that silica may be reduced and retained as silicon, and that a considerable amount of carbon may be present (e.g., 1.9 and 1.8 per cent.). One experiment made with a view to ascertain how much carbon nickel may take up under conditions to which it is more or less exposed in the processes of manufacture and casting, was to pack half-a-pound of granular commercial nickel in layers with charcoal in a Hessian crucible, in which it was exposed to a full red-heat twelve hours. No fusion took place. The temperature was then raised till there was complete fusion. The resulting metal was strongly magnetic, quite soft, and to a considerable extent malleable. Its specific gravity was 8.04, and it had a fracture like that of fine-grained pig-iron, scales of graphite being plainly visible. It was found to contain of total carbon 2.105, 2.130; graphitic carbon, 2.030, 1.990; silicon, .360. Mr. Gard also made some experiments on the department of nickel and cobalt towards hydrocarbon at a high temperature, the substances being placed in a platinum trough within a porcelain tube and treated with a slow current of pure dry marsh-gas at a full red heat. In one case thin plates of pure electroplate nickel (8597 gr.) were found at the close to have gained 10.649 per cent.; in another 1.2697 gr. of cobalt gained 12.758 per cent.

Among other chemical contributions we note one on the iodates of cobalt and nickel, by Mr. Fullarton, who finds that the true normal iodates contain really six molecules of water of crystallisation, and that they are essentially different from the salts obtained by Rammelsberg. Several specific-gravity determinations follow (by students of Cincinnati University), including those of a series of chromates, by Miss Abbot. Pettersson has lately shown that selenates have molecular volumes exceeding those of the corresponding sulphates by six for each molecule of the acid radicle. On comparing the chromates with Pettersson's selenates, it is found that the two series of salts have approximately equal molecular volumes; the difference, if any exists, being very slightly plus for the selenates. If regularities of this kind can be thoroughly established, it will be easy (Prof. Clark suggests), having the density of a chromate, to calculate that of the corresponding sulphate or selenate, or *vice versa*.

A preliminary catalogue of the reptiles, fishes, and Leptocardians of the Bermudas is furnished by Mr. Brown Goode, comprising 148 out of 163 known species. The Bermudan fauna shares with the West Indies 116 species (or 79 per cent.), of which 58 (or 40 per cent.) are peculiar to the West Indies, while many others have their centres of distribution in that region. With the Eastern United States Bermuda shares 47 species, and with the waters of the Pacific and Indian Ocean 32 species. Mr. Goode also gives a description of four species of fishes believed to be new.

Prof. Dana draws some lithological and orographic conclusions in his (continued) paper on the relations of the geology of Vermont to that of Berkshire, and the *Journal* also contains some information on the Archæan of Canada and the geology of New Hampshire, &c.

#### THE EARTHWORM IN RELATION TO THE FERTILITY OF THE GROUND

FROM observations extending over a number of years, M. Hensen is led to the conclusion that infertile undersoil is rendered valuable by the action of worms in two ways, viz., by the opening of passages for the roots into the deeper parts, and by the lining of these passages with humus. This will be more fully understood from the following facts regarding the life-habits of the worm (*Lumbricus terrestris*) given in M. Hensen's paper in the *Zeitschrift für wissenschaftliche Zoologie*.

It is known that the adult animals in wet weather come up to the surface by night, and, with their hinder end in their tube,